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COUNTRY ANALYSIS BRIEFS

China

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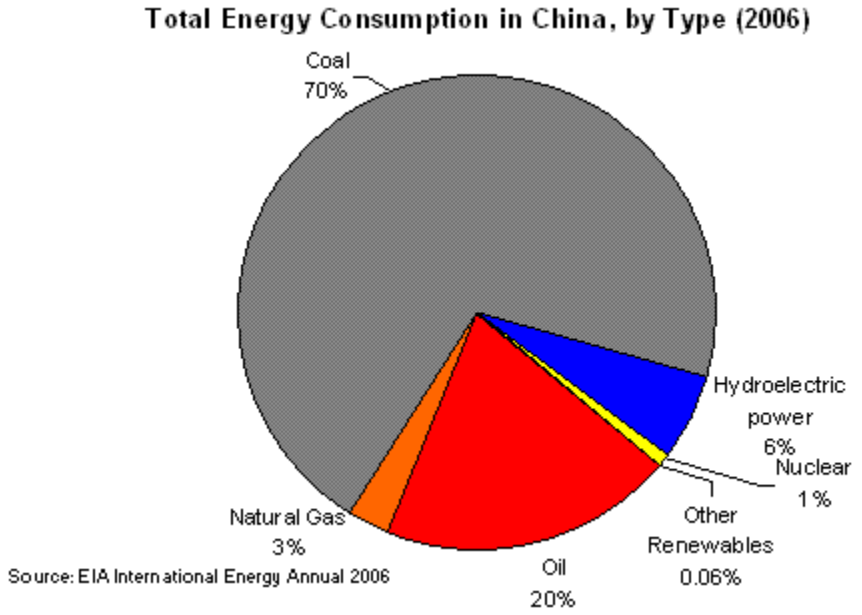
Background

China is the world's most populous country and the second largest energy consumer behind the United States. Rising oil demand and imports have made China a significant factor in world oil markets.

China is the world's most populous country and has a rapidly growing economy. China's real gross domestic product (GDP) is estimated to have grown at about 9 percent in 2008, while the country has registered average growth of 10 percent between 2000 and 2008. The recent global financial crisis has caused China's GDP to slow from highs of 13 percent in 2007, to 6.1 percent in the first quarter of 2009 (measured against Q1 2008), the lowest quarterly rate in 10 years. Most analysts predict growth of less than the government's target of 8 percent for 2009 as a whole; however, the second quarter 2009 rebounded somewhat and grew at 7.9 percent year over year according to the Chinese government. China's recent 4-trillion yuan ($586 billion) economic stimulus package, launched in November 2008, is focused on boosting China's domestic consumption (currently about a third of real GDP) and fixed asset investment, as well as improving industry value chains and energy conservation in order to decrease dependence on an export-driven economy. Using various measures such as tax reductions, rebates, fiscal subsidies, greater access to credit, and direct government expenditures, China is targeting almost all sectors of the economy: real estate/construction, transportation and power infrastructure, agriculture, social services, heavy and light industry, Sichuan earthquake reconstruction, technology advancement, and rural development. In light of the government's goals for energy security and energy efficiency, China is using its stimulus package through vehicles such as tax breaks, advantageous lending rates, and a foreign exchange fund to encourage state-owned oil companies to expand upstream investments abroad, increase downstream refining capacity, and augment crude and oil product stockpiles. Analysts anticipate the fiscal stimulus will translate into economic development in the second half of 2009 and 2010 and generate at least a moderate increase of domestic consumption including demand for energy commodities.

Despite the economic slowdown in exports and domestic demand in the past year, China's demand for energy remains high. China has emerged from being a net oil exporter in the early 1990s to become the world's third-largest net importer of oil in 2006. Natural gas usage in China has also increased rapidly in recent years, and China has looked to raise natural gas imports via pipeline and liquefied natural gas (LNG). China is also the world's largest producer and consumer of coal, an important factor in world energy markets.



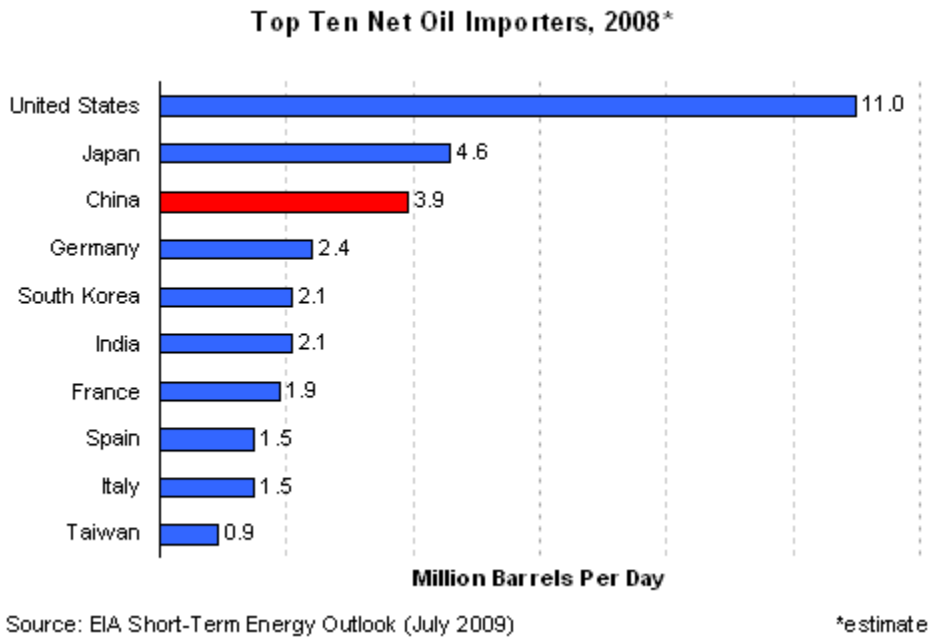
Coal supplied the vast majority (70 percent) of China's total energy consumption requirements in

2006. Oil is the second-largest source, accounting for 20 percent of the country's total energy consumption. While China has made an effort to diversify its energy supplies, hydroelectric sources (6 percent), natural gas (3 percent), and nuclear power (1 percent) account for relatively small amounts of China's energy consumption mix.

Oil

China is the world's second-largest consumer of oil behind the United States, and the third-largest net importer of oil after the U.S. and Japan.

China consumed an estimated 7.8 million barrels per day (bbl/d) of oil in 2008, making it the second-largest oil consumer in the world behind the United States. During that same year, China produced an estimated 4.0 million bbl/d of total oil liquids, of which 96 percent was crude oil. China's net oil imports were approximately 3.9 million bbl/d in 2008, making it the third-largest net oil importer in the world behind the United States and Japan. EIA forecasts that China's oil consumption will continue to grow during 2009 and 2010, with oil demand reaching 8.2 million bbl/d in 2010. This anticipated growth of over 390,000 bbl/d between 2008 and 2010 represents 31 percent of projected world oil demand growth in the non-OECD countries for the 2-year period according to the July 2009 *Short-Term Energy Outlook*. By contrast, China's oil production is forecast to remain relatively flat at 4 million bbl/d in 2009. According to Oil & Gas Journal (OGJ), China had 16 billion barrels of proven oil reserves as of January 2009.



Sector Organization

Energy Policy

The Chinese government's energy policies are dominated by the country's growing demand for oil and its reliance on oil imports. The National Development and Reform Commission (NDRC) is the primary policymaking and regulatory authority in the energy sector, while four other ministries oversee various components of the country's oil policy. The government launched the National Energy Administration (NEA) in July 2008 in order to act as the key energy regulator for the country. The NEA, linked with the NDRC, is charged with approving new energy projects in China, setting domestic wholesale energy prices, and implementing the central government's energy policies, among other duties. The NDRC is a department of China's State Council, the highest organ of executive power in the country. In 2007, China outlined its energy policy goals in the Proposed Energy Law, though the law has yet to be enacted.

National Oil Companies

China's national oil companies (NOCs) wield a significant amount of influence in China's oil sector. Between 1994 and 1998, the Chinese government reorganized most state-owned oil and gas assets into two vertically integrated firms: the China National Petroleum Corporation (CNPC) and the China Petroleum and Chemical Corporation (Sinopec). These two conglomerates operate a range of local subsidiaries, and together dominate China's upstream and downstream oil markets. CNPC remains the much larger and influential NOC and is the leading upstream player in China. CNPC, along with its publicly-listed arm PetroChina, account for roughly 60 percent and 80 percent of China's total oil and gas output, respectively. Sinopec, on the other hand, has traditionally focused on downstream activities such as refining and distribution with these sectors making up 76 percent of the company's revenues in 2007.

Additional state-owned oil firms have emerged in the competitive landscape in China over the last several years. The China National Offshore Oil Corporation (CNOOC), which is responsible for offshore oil exploration and production, has seen its role expand as a result of growing attention to offshore zones. Also, the company has proven to be a growing competitor to CNPC and Sinopec by not only increasing its E&P expenditures in the South China Sea but also extending its reach into the downstream sector particularly in the southern Guangdong Province through its recent 300 billion yuan investment plan. The Sinochem Corporation and CITIC Group have also expanded their presence in China's oil sector, although their involvement in the oil sector remains dwarfed by CNPC, Sinopec, and CNOOC. The government intends to use the stimulus plan to enhance energy security and strengthen Chinese NOCs' global position by offering various incentives to invest both upstream and downstream.

Pricing Reform

The Chinese government decided to launch a fuel tax and reform of the country's product pricing mechanism in December 2008 in order to tie retail oil product prices more closely to international crude oil market, attract downstream investment, ensure profit margins for refiners, and reduce energy intensity caused by distortions in the market pricing. When international crude oil prices skyrocketed in mid-2008, the capped fuel prices downstream caused some refiners, especially the smaller teapots, to cease production causing supply shortfalls and the major NOCs, particularly Sinopec, to incur substantial profit losses. During the first half of last year, the government issued value added tax rebates on fuel imports and some direct subsidies to stem state-refiners' losses.

China is taking advantage of the economic recession to liberalize its pricing system and encourage more market responsiveness. When fuel prices fluctuate more than 4 percent of the average crude oil price of three grades over 22 consecutive working days, the NDRC can alter the ex-refinery price. The government also sets transportation charges, processing costs, and refining margins (5 percent when crude prices are below $80/bbl). Additionally, a consumption tax and value-added tax is added for gasoline and diesel fuels. These taxes are set to replace six transportation fees established by local authorities.

In light of these reforms, China has raised fuel prices three times so far in 2009. The latest increases on June 30 were 11 percent for gasoline and diesel, and retail rates are at the highest level in history. Refinery gate prices for gasoline and diesel are now 6,730 yuan/ton and 5,990 yuan/ton, respectively.

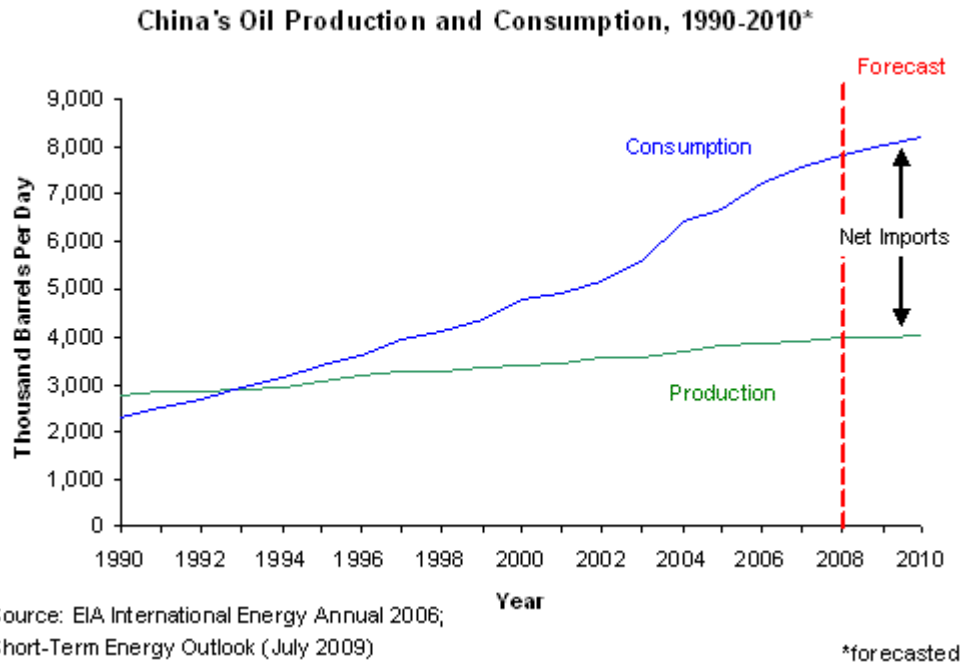
Exploration and Production

China's largest oil fields are mature and

China's total oil production reached 4.0 bbl/d in 2008, similar to production in 2007. China's

production has peaked, leading companies to focus on developing largely untapped reserves in the western interior provinces and offshore fields.

largest and oldest oil fields are located in the northeast region of the country. CNPC's Daqing field produced about 801,000 bbl/d of crude oil in 2008, according to FACTS Global Energy's most recent estimate. Sinopec's Shengli oil field produced about 553,000 bbl/d of crude oil during 2008, making it China's second-largest oil field. However, Daqing, Shengli, and other ageing fields have been heavily tapped since the 1960s, and are expected to decline significantly in output in the coming years. Recent exploration and production (E&P) activity has focused on the offshore areas of Bohai Bay and the South China Sea as well as onshore oil and natural gas fields in western interior provinces such as Xinjiang, Sichuan, Gansu, and Inner Mongolia (see the South China Sea Report for more information).



Onshore

Roughly 85 percent of Chinese oil production capacity is located onshore. Although offshore E&P activities have increased substantially in recent years, China's interior provinces, particularly in the northwest's Xinjiang Province, have also received significant attention. The onshore Junggar, Turpan-Hami, and Ordos Basins have all been the site of increasing E&P work, although the Tarim Basin in northwestern China's Xinjiang Uygur Autonomous Region has been the main focus of new onshore oil prospects. Reserve estimates for Tarim vary widely, with IHS Energy reporting that some estimates are as high as 78 billion barrels of total in-place oil reserves. The basin is home to Sinopec's Tahe oil field, with an estimated 996 million tons of in-place oil and gas reserves after a recent addition of 135 million tons in 2008. Since 2005, hydrocarbon production from Tarim has doubled, and the NOCs are taking advantage of tax breaks and other incentives to develop the region and offset declines in mature basins. CNPC signed production sharing contracts (PSCs) in 2007 with foreign firms to co-develop the Liangjing and Jilin blocks in the sizeable Songliao basin in the northeast.

China's NOCs are also investing significantly in technologies to increase oil recovery rates at the country's mature oil fields. Increasingly, CNPC is utilizing natural gas supplies from the Daqing field for reinjection purposes to fuel enhanced oil recovery (EOR) projects. CNPC hopes that EOR techniques can help stabilize Daqing's oil output in the years ahead. However, China's domestic demand for natural gas supplies is also increasing, which may put a competing claim on natural gas output from Daqing.

Offshore

About 15 percent of overall Chinese oil production is from offshore reserves, and most of China's net oil production growth will likely come from offshore fields. According to the IEA, current offshore production is 680,000 bbl/d, and is expected to rise to 980,000 bbl/d by 2014. These volumes will offset some of the declines from the more mature onshore fields in eastern China.

Offshore E&P activities have focused on the Bohai Bay region, Pearl River Delta, South China Sea, and, to a lesser extent, the East China Sea. The Bohai Bay Basin, located in northeastern China offshore from Beijing, is the oldest oil-producing offshore zone and holds the bulk of proven offshore reserves in China. In May 2007, PetroChina announced a reserve assessment of its newest oil field in Bohai Bay, which the company claims could be the largest oil find in three decades once a final reserve estimate is made. The Nanpu field holds proven oil reserves of 3.7 billion barrels, with probable and possible reserves much higher. PetroChina initiated phase one development of the Nanpu field in June 2007, and hopes to bring 200,000 bbl/d of crude oil production onstream by 2012. Peak output of 500,000 bbl/d is expected to be reached as part of a second phase development plan, which would make Nanpu the third-largest oil field in China after Daqing and Shengli.

Even before the Nanpu discovery was logged, offshore areas were expected to account for much of China's growth in oil production. CNOOC made 8 new discoveries in offshore reserves, increasing the company's proven oil reserves to 1.6 billion barrels. CNOOC intends to double oil production in the Bohai Bay where over half of the NOC's production is expected to originate by 2015. ConocoPhillips, the largest foreign company acreage holder in the Bohai Bay, is expanding production at the company's Peng Lai field, China's largest producing offshore field. The company expects to siphon a total 170,000 bbl/d from Peng Lai by 2010, up from 45,000 bbl/d currently. ConocoPhillips and CNOOC aim to complete Phase II of the field development which includes 5 platforms by May 2010. CNOOC brought one block in the company's Bozhong oil field online in March 2009 pumping 4,000 bbl/d. Total production from the Bozhong fields is expected to reach 25,000 bbl/d in 2011.

In 2007, CNOOC's production totaled 372 bbl/d with about 37 percent coming from the South China Sea developments. CNOOC, ConocoPhillips, and Devon Energy are developing the Panyu oilfields with output peaking at 60,000 bbl/d. In 2008, CNOOC, along with its partner Husky Energy of Canada, commenced commercial production at the Wenchang oil fields at an initial rate of 14,000 bbl/d. Wen 19-1 is expected to produce nearly 19,000 bbl/d with other platforms under development. CNOOC also brought on the Xijiang 23-1 field onstream in 2008, which is expected to produce 40,000 bbl/d of crude oil.

Whereas onshore oil production in China is mostly limited to CNPC and CNOOC, the two major upstream NOCs, international oil companies have been granted much more access to offshore oil prospects mainly through PSC agreements. Aside from ConocoPhillips, other foreign oil majors involved in offshore E&P work in China include: Shell, Chevron, BP, Husky, Anadarko, and Eni, among others. These IOCs leverage their technical expertise in order to partner with a Chinese NOC and make a foray into the Chinese markets. In 2009, CNOOC offered 17 blocks in the deepwater offshore parts of the South China Sea to encourage more exploration in these more technically challenging areas.

Territorial Disputes

CNOOC is also involved in exploration activities in the East China Sea, although territorial disputes with its neighbors have so far limited large-scale development of fields in the region. China and Japan's Exclusive Economic Zones (EEZs) overlap in parts of the East China Sea that are believed to hold hydrocarbon reserves. The two countries have held negotiations over the past couple years in hopes of resolving the disputes, and in June 2008, the two countries reached an agreement to jointly develop the Chunxiao/Shirakaba and Longjing/Asurao fields. The agreement stipulated that the investors would share profits and risks equally. However, in early 2009, the agreement unraveled when China asserted sovereignty over the fields following Japanese disputes of actual E&P work at the fields. (See East China Sea brief for more details.)

China claims ownership of a portion of the potentially hydrocarbon rich Spratly Islands in the South China Sea, as do the Philippines, Malaysia, Taiwan, and Vietnam. In June 2007, BP abandoned plans to conduct exploration activities near the Spratly Islands, citing ongoing uncertainty over competing ownership claims between China and Vietnam. Also, as a result of the Philippines' passing a legislative bill claiming the islands, China has protested. The Paracel Islands, which China first occupied in 1974, are also claimed by Vietnam (see the Vietnam Country Analysis Brief and the South China Sea brief for more details.)

Overseas E&P

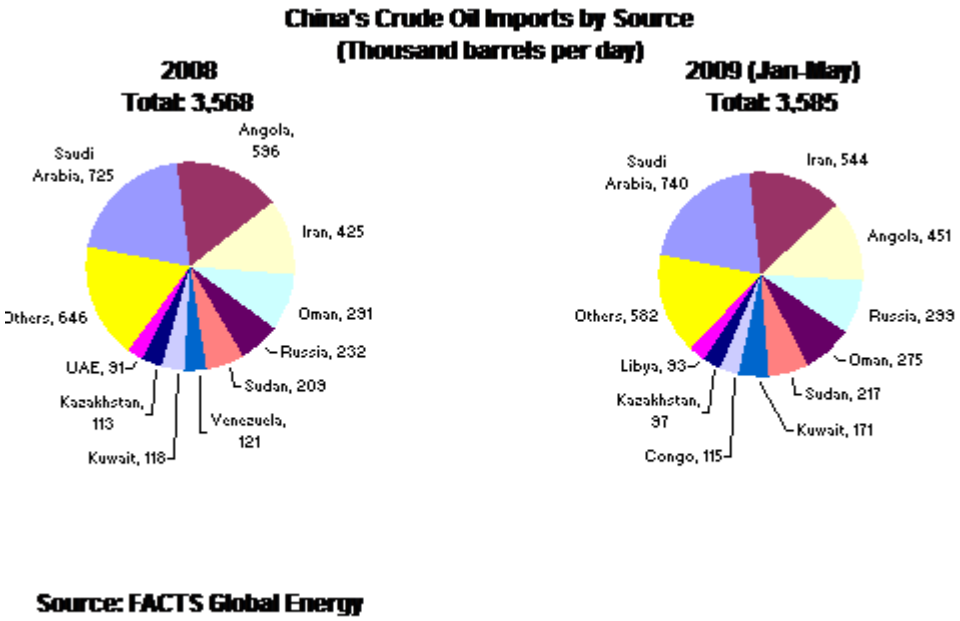
With China's expectation of growing future dependence on oil imports, Chinese NOCs have sought interests in E&P projects overseas. CNPC has been the most active company, while Sinopec, CNOOC, and other smaller NOCs have also expanded their overseas investment

profile. China is taking advantage of the economic downturn and lower asset values to step up its global acquisitions and financing of projects in upstream, midstream, and downstream sectors. One of the financing strategies this year to secure long-term deals is China's bilateral loan-for-oil deals with several countries. These loans amount to about $50 billion or 70 percent of the total investments by the 3 major NOCs since 2008 according to industry sources. While several resource-rich countries have been strapped for cash during the credit crunch of 2008-09, China can use its vast foreign exchange reserves, estimated at $2 trillion, to help leverage such investments. China finalized loan for oil deals recently with Russia, Brazil, Venezuela, Kazakhstan, Ecuador and reportedly agreed to a loan of $3 billion to Turkmenistan to assist in developing the South Iolotan gas field project to feed the Central Asia Gas Pipeline. China agreed to loan Russian companies, Rosneft and Transneft $25 billlion to finance the East Siberia Pacific Ocean oil pipeline in exchange for 300 million bbl/d of oil shipments. The Chinese Development Bank (CDB) agreed to loan Petrobras of Brazil $10 billion so that Sinopec can access 200 million bbl/d of oil for export to China. The loan to Venezuela stands at $4 billion to finance various projects to increase oil exports to China almost three-fold to 1 million bbl/d by 2015. CNPC and the China Export-Import Bank intend to lend Kazakhstan $5 billion each in two loans allowing CNPC a much larger role in the upstream oil development in the Central Asian country, following the company's acquisition of PetroKazakhstan in 2005.

China's overseas equity oil production grew from 760,000 bbl/d in 2007 to 820,000 bbl/d in 2008. Overseas equity production represented roughly 29 percent of China's total oil production in 2008. According to PFC Energy, CNPC is the Chinese NOC investor in other countries and held international assets in 29 countries by the end of 2008. The NOC also held 602,000 bbl/d in 2007, about 80 percent of total Chinese overseas equity production. As China expands its refining capacity to accept sour and high-sulfur crude oil, Chinese NOCs are looking to invest in more Middle Eastern fields such as in Iran, Iraq, and Syria and in Latin America. CNPC and Sinopec recently signed contracts with Iran to develop the North Azadegan and Yadavaran oil fields, and CNPC won a bid to develop the Rumalia oil field, one of the largest, in Iraq in July 2009.

Oil Imports

The Middle East remains the largest source of China's oil imports, although African countries also contribute a significant amount to China's oil imports. According to FACTS Global Energy, China imported 3.6 million bbl/d of crude oil in 2008, of which approximately 1.8 million bbl/d (50 percent) came from the Middle East, 1.1 million bbl/d (30 percent) from Africa, 101,000 bbl/d (3 percent) from the Asia-Pacific region, and 603,000 bbl/d (17 percent) came from other countries. A similar pattern is evident in import data from the first five months of 2009 (see the pie charts below for greater detail). In 2008, Saudi Arabia and Angola were China's two largest sources of oil imports, together accounting for over one-third of China's total crude oil imports (see the Saudi Arabia and Angola Country Analysis Briefs for more information). China exported about 75,000 bbl/d of crude oil in 2008. China imported approximately 0.8 million bbl/d and exported 0.3 million bbl/d of key petroleum products including LPG, gasoline, diesel, jet fuel, fuel oil, and lubricants in 2008.



Pipelines

China has actively sought to improve the integration of the country's domestic oil pipeline network as well as to establish international oil pipeline connections with neighboring countries to diversify oil import routes. In March 2007, CNPC spearheaded the Beijing Oil & Gas Pipeline Control Center that monitors all long-distance pipelines and perform data collection for enhanced efficiency on the system.

Domestic System

According to the CNPC, China has about 11,245 miles of total crude oil pipelines (69 percent managed by CNPC) and nearly 3,000 miles of oil products pipelines in its domestic network. Total oil liquids and natural gas pipeline is increasing at about 6 percent per year. At present, the bulk of China's oil pipeline infrastructure serves the more industrialized coastal markets. However, several long-distance pipeline links have been built or are under construction to deliver oil supplies from newer oil-producing regions or from downstream centers to more remote markets. In October 2006, the Western China Refined Oil Pipeline started operations. The 1,150-mile link will deliver petroleum products from Urumqi in Xinjiang Province to Lanzhou in Gansu Province. Gradually, this pipeline will connect with other regional spurs to deliver supplies to the eastern coast, as well as accommodate additional oil imports from Kazakhstan. Previously, most oil supplies from Xinjiang were delivered by rail. In addition, the Western Pipeline consists of a crude oil line traversing from Xinjiang to the Lanzhou refinery and which came online in 2007.

One of the largest domestic pipelines under development is PetroChina's planned Zhengzhou-Urumqi crude oil pipeline, which would traverse more than 1,600 miles and have a transport capacity of 300,000 bbl/d. Commissioning of the entire pipeline is expected by 2010. PetroChina also has plans to build at least two additional spurs from Zhengzhou, located in the populous Henan Province, which would help deliver crude oil supplies eastward. One is the Zhengzhou-Jinzhou pipeline, which would deliver oil northeastward to Hubei Province. The other is the Zhengzhou-Changsha link, which would terminate in Hunan Province near the industrial southeast. Parts of these links came online in 2009, and altogether will form the country's largest oil product pipeline network.

International Connections

China inaugurated its first transnational oil pipeline in May 2006 when it began receiving Kazakh and Russian oil from a pipeline originating in Kazakhstan. The new 200,000 bbl/d pipeline spans 620 miles, connecting Atasu in northern Kazakhstan with Alashankou on the Chinese border in Xinjiang. The pipeline was developed by the Sino-Kazakh Pipeline Company, a joint venture between CNPC and Kazakhstan's KazMunaiGaz (KMG). The pipeline's third leg from Kenkiyak to Atasu and an expansion of the entire pipeline, doubling capacity to 400,000 bbl/d, are to be

completed in 2011 by CNPC. Due to financial problems resulting from the recent economic crisis, KMG signed a deal allowing CNPC equity in the upstream oil in return for loans financing several downstream infrastructure projects, including the Kenkiyak to Atasu section. Industry publications suggest that the Atasu to Alashankou line has been running at about 50 percent of capacity, or slightly over 100,000 bbl/d. The new pipeline from would also connect with Russian crude from western Siberia.

Russia's Far East will soon be a source for Chinese crude oil imports. Russian state-owned oil giant Transneft began construction in April 2006 on a pipeline that will span 2,972 miles from the Russian city of Taishet to the Pacific Coast (see Russia Country Analysis Brief). Known as the Eastern Siberia-Pacific Ocean Pipeline (ESPO), the project will be completed in two stages. The first stage of the project includes the construction of a 600,000 bbl/d pipeline from Taishet to Skovorodino. CNPC signed an oil-for-loans agreement with Russian companies Rosneft and Transneft for $25 million and $15 million, respectively, in early 2009 and entails China financing the 43-mile pipeline spur to run from ESPO to the Chinese border in exchange for crude oil deliveries. The first phase of ESPO is expected to be completed in December 2009 and deliver 300,000 bbl/d to the Chinese border beginning in 2011 for 20 years. Furthermore, CNPC intends to build a 597-mile pipeline linking the spur with the Daqing oil field in the northeast. In the future, a second phase will extend the pipeline from Skovorodino to Kozmino Bay on the Pacific Coast, which is expected to accommodate Russian crude oil exports to both China and Japan. However, the second phase of the ESPO is not likely to be commissioned until 2015 or thereafter.

China has also revived its plans to construct an oil import pipeline from Myanmar through an agreement signed in March 2009. As Myanmar is not a significant oil producer, the pipeline is envisioned as an alternative transport route for crude oil from the Middle East and Africa that would bypass the potential choke point of the Strait of Malacca (see the World Oil Transit Choke Points Brief for more information). The $2.9 billion project will include parallel oil and gas pipelines, and stakeholders include CNPC and Myanmar Oil and Gas Enterprises. There has been no final agreement on the capacity of the pipeline, though the initial target is around 150,000, and construction should be underway in 2009.

Refining

China had 6.4 million bbl/d of crude oil refining capacity at 53 facilities as of January 2009, according to OGJ. Other sources report higher refinery capacity at end-2008. The NEA's goal is to raise refining capacity to 8.8 million bbl/d by 2011. According to the BP Statistical Review of World Energy, refinery utilization in China increased from 67 percent in 1998 to 89 percent in 2008.

Sinopec and CNPC are the two dominant players in China's oil refining sector, accounting for 50 percent and 35 percent of the capacity, respectively. However, CNOOC entered the downstream arena and commissioned the company's first refinery, the 240,000 bbl/d Huizhou plant, in March 2009 in order to process the high-sulfur crudes from its Bohai Bay fields. Sinochem has also proposed a number of new refineries, and national oil companies from Kuwait, Saudi Arabia,

Russia, and Venezuela have also entered into joint-ventures with Chinese companies to build new refining facilities. Sinopec and PetroChina plan to commission about 450,000 bbl/d and 400,000 bbl/d, respectively, of expansion and greenfield capacity by 2011 according to industry sources. In light of the recent economic downturn, some firms have postponed launching refinery projects until product demand picks up again. Also, the NDRC outlined in May 2009 that it plans to eliminate refineries of 20 kbbl/d with inefficient equipment and ban any new projects in efforts to encourage economies of scale and energy efficiency measures. In addition, PetroChina (CNPC) is recently branching out to acquire refinery stakes in other countries in efforts to move downstream and secure more global trading and arbitrage opportunities. The company recently purchased a 45.5 percent stake in Singapore Petroleum for $1 billion, and received approval to purchase 49 percent of Nippon Oil's Osaka refinery in Japan in June 2009.

The expansive refining sector has undergone modernization and consolidation in recent years, with dozens of small refineries (teapots), accounting for about 20 percent of total fuel output, shut down and larger refineries expanding and upgrading their existing systems. Domestic price regulations for finished petroleum products have hurt Chinese refiners, particularly smaller ones, because of the large gulf between international oil prices and China's relatively low domestic rates. In 2008, Sinopec and CNPC (PetroChina) reportedly had refining losses of nearly $29 billion before the Chinese government provided direct subsidies to partially cover the losses.

Planned New Refinery Projects and Upgrades in China

Owner	Location	Capacity	Planned start-date	Notes
Sinopec	Fujian	160,000	Mid-2009	Upgrade, developed with Aramco and ExxonMobil
	Tianjin	200,000	11/2009	Upgrade
	Maoming	130,000	2010	Upgrade, construction begins late 2009
	Guangdong	300,000	2010	Environmental denied, developing with Kuwait Petroleum
	Zhenhai/Zhejiang	300,000	-	Expansion
CNPC/PetroChina	Dushanzi	80,000	2009Q3	Upgrade
	Qinzhou/ Guangxi	200,000	2010	New construction, on hold
	Tianjin	200,000	2012	Feasibility stage; JV with Rosneft
	Guangdong/ Jieyang	400,000	-	New construction; developed with PDVSA
	Lanzhou	110,000	End 2009	Expansion
	Henan	200,000	-	Feasibility study begun June 2009
	Changzhou	200,000	2015	Feasibility study
	Liaoyang	110,000	-	Expansion, approval pending
	Jilin	110,000	2010	Expansion
CNOOC	Huizhou	200,000	May 2010	Expansion
Sinochem	Quanzhou	100,000	2011	Preliminary approval
	Ningbo	240,000	2011	Pending approval

Sources: Global Insight and FACTS Global Energy

As China diversifies its crude oil import sources and expands oil production domestically, state-owned refiners will have to adjust to the changing crude slate. Traditionally, many of China's refineries were built to handle relatively light and sweet crude oils, such as Daqing and other domestic sources. In recent years, refiners have built or upgraded facilities to support greater Middle Eastern crude oil imports, which tend to be heavy and sour. However, more recently,

China's refiners have also had to prepare for high-acid and high-sulfur crude oil streams. Much of the country's planned new oil production in the offshore Bohai Bay is considered high-acid, and China is the largest importer of Sudan's Dar Blend, a high-acid crude (see the Sudan Country Analysis Brief for more information). High-acid crude oil tends to be light and sweet, but refiners must install stainless steel metallurgy or utilize other advanced processes to successfully run the crude streams.

Strategic Oil Reserves

China has used stockpiling through its SPR and commercial storage as one strategy in recent years to ensure oil reserves, and this could increase China's need for imported oil in the future. In China's 10th 5-Year Plan (2000-2005), launched in 2001, Chinese officials decided to establish a government-administered strategic oil reserve program to help shield China from potential oil supply disruptions. This system will be built in three stages, and, in 2004, China started construction at four sites that would comprise the first phase of the country's nascent strategic oil reserve program. Phase 1 has a total storage capacity of 103 million barrels at four sites, and was completed in early 2009. Phase 1 storage capacity will amount to approximately 25 days of net oil imports based on 2008 estimates of Chinese oil demand. Phase 1 sites include: Zhenhai in Zhejiang Province (planned capacity 32 million barrels); Aoshan, also in Zhejiang Province (31 million barrels); Huangdao in Shandong Province (20 million barrels); and Dalian in Liaoning Province (19 million barrels). Thereafter, Phase 2, already under construction, is expected to increase capacity to almost 270 million barrels by 2011. Ultimately, Phase 3 is expected to bring total strategic oil reserve capacity in China to about 500 million barrels, although there is no timetable set for this plan.

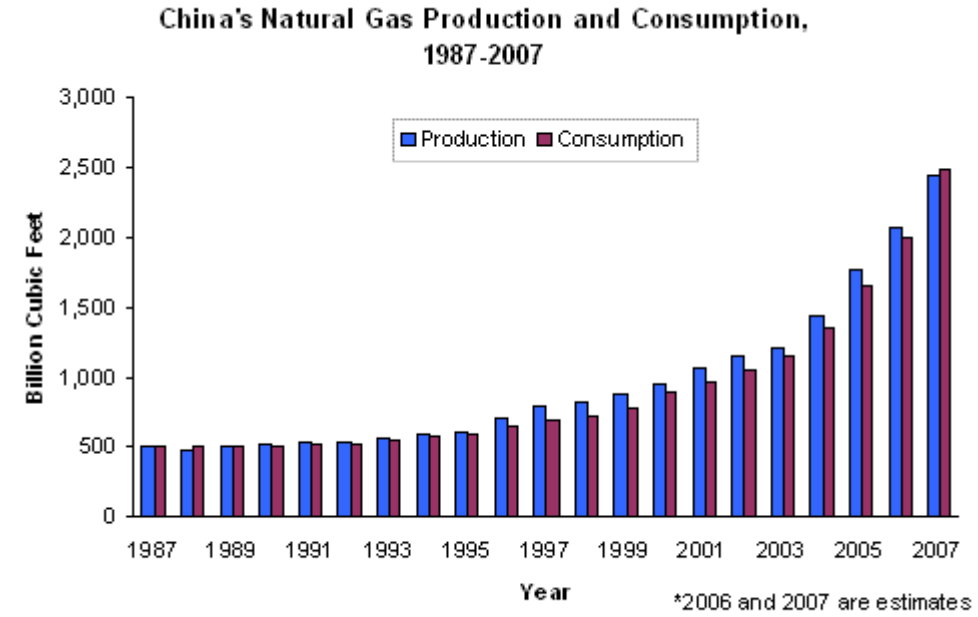
The government ceased filling the SPR in 2007 because of mounting crude oil prices, though, between September 2008 and March 2009 when prices descended, the government injected about 60 million bbl (more than 300 kbbl/d). The average cost of Phase I SPR storage was $58/bbl.

In addition to the SPR, China has approximately 300 million barrels of commercial crude oil storage capacity according to some industry sources, though this number cannot be verified. Also, the government reported that it plans to create a strategic refined oil stockpile to be operated by a subsidiary of NDRC and aims to boost stocks to 80 million barrels by 2011. In addition, China plans to increase commercial oil product storage to 252 million barrels by 2013. Details of these plans are still under development.

Natural Gas

Although natural gas use is increasing in China, it only comprised 3 percent of the country's total energy consumption in 2006.

Historically, natural gas has not been a major energy source in China, but its share in the country's consumption mix is slowly increasing. According to OGJ, as of January 2009, China had 80 trillion cubic feet (Tcf) of proven natural gas reserves, having risen significantly since 2006. While proven reserves have increased, China's production and demand of natural gas has also risen substantially. In 2007, China produced 2,446 billion cubic feet (Bcf) of natural gas while the country consumed 2,490 Bcf, and for the first time in almost 2 decades, the country became a net natural gas importer. Consumption for 2007 rose from 2006 levels by about 25 percent, and the country began importing liquefied natural gas (LNG), amounting to nearly 140 Bcf in 2007, to fill the gap. Although a majority of the gas consumption is dominated by industrial users the recent growth of gas consumption in the past few years is attributed to all sectors: industrial and petrochemical, power, and residential. The industrial sector including chemicals consumed over 40 percent of the market share of gas in 2007 according to FACTS Global Energy, and future gas growth will be led by the power and residential/commercial sectors. The Chinese government anticipates boosting the share of natural gas as part of total energy consumption to 10 percent by 2020 to alleviate high pollution from the country's heavy coal use. EIA projects gas demand to nearly triple by 2030, growing about 4.5 percent per year according to the 2009 *International Energy Outlook*. To meet this anticipated shortfall, China is expected to continue importing natural gas in the future via LNG and is considering a number of potential import pipelines from neighboring countries.



Source: EIA International Energy Annual

Sector Organization

As with oil, the natural gas sector is dominated by the three principal state-owned oil and gas companies: CNPC, Sinopec, and CNOOC. CNPC is the country's largest natural gas company in both the upstream and downstream sectors. In 2008, CNPC data shows that the company accounted for over three-fourths of China's total natural gas output. Sinopec and CNOOC are also playing an increasing role in the natural gas sector. Sinopec operates the Puguang natural gas field in Sichuan Province, one of China's most promising upstream assets. CNOOC led the development of China's first two LNG import terminals at Shenzhen in Guangdong Province and Fujian and manages much of the country's offshore production.

China's natural gas prices, similar to retail oil prices are regulated based on regional pipeline infrastructure development and the industry customer class and have generally remained well below market rates. China has favored manufacturing and fertilizer gas users by the lower price these sectors pay compared to residential consumers. In order to bolster investment in the growing sector particularly by foreign participants and make domestic gas competitive with other fuels as well as with imported pipeline and liquefied natural gas, the NDRC proposed to indirectly link gas prices to international crude oil prices, effectively raising prices overall in May 2009. Industry analysts claim these price modifications are necessary to further develop the gas market but are likely to be enacted gradually so as not to damage the country's industrial sector during the economic downturn.

Exploration and Production

China's primary natural gas-producing regions are Sichuan Province in the southwest (Changqing Basin); Shaanganing Province (Ordos Basin); the Xinjiang Uygur Autonomous Region and Qinghai in the northwest (Tarim, Chungeer, and Caidamu Basins) and produce about 65 percent of China's total gas output. Several offshore natural gas fields are located in the Bohai Basin and the Panyu complex in the South China Sea. China's NOCs have also logged several new natural gas finds in the last few years following aggressive exploration and production (E&P) work. The largest recent discovery was Sinopec's find at the Puguang field in Sichuan Province in March 2006, which holds proven natural gas reserves of 17.7 Tcf. Sinopec started commercial production at Puguang in 2008 at a rate of about 130 Bcf/y. In 2010, Sinopec expects to double Puguang's production capacity based on expansion plans. Sichuan Province also holds the high sulphur content fields at the Chuandongbei basin. Proven gas reserves are 6.2 Tcf. In 2007, CNPC awarded a 30 year contract with Chevron to help develop the technically challenging fields.

New natural gas fields continue to be developed in the northwestern Tarim and Ordos Basins in Xinjiang. Natural gas output in Xinjiang reached 850 Bcf in 2008 and is currently China's largest gas producing province. In particular, the Tarim Basin holds at least 35.3 Tcf proven natural gas

reserves, half of China's total proven reserves, and only 12 percent of the basin has been explored thus far. However, the basin's complex geological features and far distance from China's main consumption centers make development costs relatively higher in the region. PetroChina's cross-country West-East Gas Pipeline, which spans 2,500 miles from the Xinjiang Uygur Autonomous Region to Shanghai, has greatly expanded the upstream potential of the Tarim Basin to supply markets in eastern China. Tarim was the largest gas-producing field in China in 2008, with 612 Bcf or 22 percent of China's total production. PetroChina endeavors to increase production at Tarim to over 1 Bcf in 2015 and 1.8 Bcf in 2020 in order to feed the West-East pipeline and planned additions. The NOC is currently developing the recently discovered Tazhong 1 field in the basin and the Dina-2 gas field with proven natural gas reserves of 1.4 Tcf and 6.2 Tcf, respectively, and both slated to come online in 2009. Other newly discoveries in the northwest that have high potential of gas supply are the Junggar Basin in Xinjiang Province and the Qaidam Basin in Qinghai Province.

Offshore

Offshore zones have also received increasing attention for upstream natural gas developments in China, particularly in the South China Sea. The South China Sea is home to the Yacheng 13-1 field, China's largest offshore natural gas field and a primary source of energy for Hong Kong's power stations. The Yacheng 13-1 field is operated by BP (34 percent), with CNOOC (51 percent) and Kuwait Foreign Petroleum Exploration Company (15 percent), and produces about 124 Bcf/y of natural gas. CNOOC plans to increase capital expenditure in 2009 by 19 percent to $6.76 billion with $1.1 billion tagged for exploration projects, mainly in the South China Sea and Bohai Bay. CNOOC's long-term development plan is to spend about $29 billion between now and 2020 launching projects in the South China Sea. The Panyu 30-1 field was brought on this year and is expected to peak at 160 MMcf/d. In June 2006, CNOOC and Husky Energy announced the country's first deepwater natural gas discovery at the Liwan 3-1-1 field in the South China Sea, which the companies preliminarily estimate holds up to 6 Tcf of natural gas reserves. CNOOC plans to work with Husky and Anadarko to develop the Liwan field and expects to start commercial operations by 2013 with a peak production of 150 MMcf/d.

Pipelines

China has a fragmented natural gas pipeline network though the government is investing in integrating local gas distribution networks and plans to construct 4,800 miles of new pipelines between 2007 and 2010. CNPC estimates that China had 16,150 miles of natural gas pipelines at the end of 2008 (for comparison, the United States had 305,954 miles as of the end of 2008). While the major NOCs operate the trunk pipelines, local transmission networks are operated by various local distribution companies throughout China, which often act as effective regional monopolies. This has so far prevented the emergence of a national gas transmission grid. Some industry analysts argue that the lack of competition in natural gas distribution and the highly regulated domestic prices in the wholesale and retail markets has stunted more rapid growth of natural gas consumption in China. CNPC moved into the downstream gas sector recently through aggressive investments totaling $108 million in gas retail projects in 14 provinces. Also, CNPC intends to use China's stimulus package for moving forward several pipeline projects in order to facilitate domestic gas transportation as well as increase gas imports for a growing market.

West-East Gas Pipeline

PetroChina's West-East Gas Pipeline, which was commissioned in 2004, is China's single-largest natural gas pipeline at 2,500 miles in length. The pipeline links major natural gas supply bases in western China (Tarim, Qaidam, and Ordos Basins) with markets in the eastern part of the country. The Chinese government promoted the construction of the West-East Gas Pipeline to boost natural gas consumption to the government's target of 3,500 Bcf/y by 2010. The West-East pipeline has an annual capacity of 424 Bcf/y and contains numerous regional spurs along the main route, which has improved the interconnectivity of China's natural gas transport network. PetroChina has plans to increase the pipeline's capacity to 600 Bcf/y in the future.

Using economic stimulus funds, CNPC is building a 1.1 Tcf/y second west-to-east trunk pipeline to accommodate additional production in the Tarim Basin and natural gas imports from Central Asia. The eastern section of the line would run from the Sino-Kazakh border to Guangzhou in Guangdong Province, spanning more than 4,000 miles at a cost of $10.3 billion and is due to be online by 2011. The western section of the line will serve the markets of Shanghai and is scheduled to begin operations at the end of 2009.

In order to accommodate greater gas flows from Central Asia, CNPC released plans to construct the third West-East Pipeline to run parallel to the second West-East line and ending in Shandong.

CNPC estimates that it will invest approximately $14.6 billion in the project. Analysts anticipate that the 0.7 to 1 Tcf/y pipeline will offtake gas from Turkmenistan's production and domestic output from the Junggar fields, though supply arrangements are still undefined. There have been proposals for a fourth and fifth West-East pipelines which are in pre-feasibility stages. The Tarim Basin is reportedly slated to feed gas to the fourth line.

International Pipelines

China does not currently import natural gas through any international pipelines, but there are several proposed pipelines that could contribute to Chinese natural gas imports in the future. In March 2006, CNPC officials signed a Memorandum of Understanding (MOU) with Russia's Gazprom for two pipeline proposals that could send natural gas supplies from Russia's Far East in the next decade. The Western route, known as the Altai Project would connect Russia's Kovykta gas field to the Xinjiang region in northwest China. The proposed pipeline would have a capacity between 1,060 – 1,410 Bcf/y and could be operational by as early as 2011. A second proposed route, called the Eastern pipeline, would connect Russia's Far East and Sakhalin Island to northeastern China, most likely terminating near Beijing. Plans for the Eastern route also call for a pipeline with 1,060 – 1,410 Bcf/y capacity (see the Russia Country Analysis Brief for more information). Russia and China continue to have ongoing negotiations on price and pipeline financing measures.

Another international pipeline proposal is the Central Asian Gas Pipeline (CAGP), which will span 1,130 miles and bring natural gas imports to China from Turkmenistan, Uzbekistan, and Kazakhstan. In July 2007, CNPC signed a Production Sharing Agreement (PSA) for the development of natural gas resources at Turkmenistan's large South Yolotan gas fields, as well as a deal with Turkmengaz, the state-owned gas company, for the import of natural gas supplies. The pipeline is expected to begin operations in 2009 with 350 Bcf/y rising to over 1 Tcf/y by 2011 and will link to the second West-East pipeline in China. Turkmenistan announced that it intends to raise the gas supply ultimately to 1.4 Tcf/y in order to diversify its customer base, though Turkmen's gas reserves have not been verified. The proposed line is slated to traverse Kazakhstan and Uzbekistan, who would likely contribute some of the natural gas exports to the pipeline. Kazakhstan could use part of the loans from China to KMG to finance the construction of the Beyneu-Bozoi-Akbulak Gas Pipeline starting in western Kazakhstan and linking to the CAGP.

CNPC signed a deal with Myanmar in March 2009 to finance the construction of a 1,123-mile pipeline from two of Myanmar's offshore blocks to Kunming, China. Preliminary work began on the project, due to commence in 2012. Daewoo, the Myanmar consortium, intends to produce 600 mmcf/d for 20 years.

Liquefied Natural Gas

As its natural gas demand is burgeoning and creating a domestic supply shortage, China is in the process of building regasification capacity as an additional source of imported volumes and looking to compete in the Asian LNG arena. However, the higher international LNG prices versus domestic gas and gas from the West-East pipeline price could cause more competition for this gas source in the future.

China imported its first shipment of LNG in the summer 2006, and the country has quickly ramped up imports since then, importing about 430 MMcf/d in 2008. CNOOC is the key LNG player in China and operates two existing plants. Dapeng LNG and Fujian LNG, joint ventures between CNOOC and BP, currently have capacities of 650 MMcf/d and 340 MMcf/d, respectively, and are serving several new gas-fired power plants and local distribution companies. CNOOC imports LNG for Dapeng from a 430 MMcf/d, 25-year contract with Australia's North West Shelf liquefaction terminal. About 65 percent of this LNG supplies six power plants with the remaining used in town gas. Following price renegotiations between the Chinese and the Indonesian governments, Fujian LNG has been receiving spot cargoes until deliveries from the contract with BP's Tangguh project in Indonesia commence in 2009.

Chinese NOCs must secure supply prior to gaining government approval to build a regasification terminal, and Chinese firms are faced with competition from other regional buyers mainly in Korea and Japan. Therefore, CNOOC and PetroChina have signed several long terms supply contracts for about 3.3 Bcf/d. These contracts are primarily with Asian firms sourcing LNG from Indonesia, Malaysia, and Australia; however Chinese NOCs have signed long-term contracts with other sources such as QatarGas and global upstream developers that can supply LNG from various international liquefaction assets. CNPC recently signed agreements with Total, Shell, and ExxonMobil, and in May 2009, CNOOC contracted 474 MMcf/d with BG Group for 20 years for

LNG supply and an equity stake at the Curtis LNG terminal in Australia.

Several regasification terminals are under construction, while Chinese NOCs and joint ventures are planning or have proposed multiple facilities. CNOOC is keenly interested in growing its LNG market as it has a competitive advantage thus far in the sector compared to the other NOCs. The company is building the 390 MMcf/d Shanghai LNG terminal that is scheduled to commence in 2009 and receive gas under a contract with Malaysia's Tiga liquefaction plant. In addition, CNOOC received approval to build its planned Zhejiang plant from the NDRC and intends to expand the company's two existing terminals and Shanghai LNG. PetroChina entered the LNG market and is currently building the Dalian and Jiangsu regasification terminals with several more proposed projects.

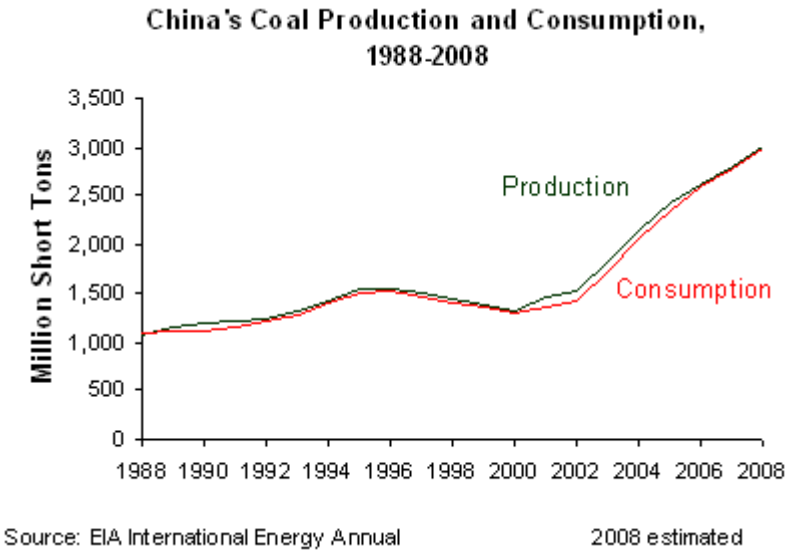
Key LNG Terminals – Current and Proposed

Terminal Name	Status/Online Date	Developer	Initial / Expansion Capacity (MMcf/d)	Possible Supplier
Dapeng/ Guangdong	Operational; Expansion: 2011	CNOOC, BP	650 / 520	Australia NWS
Fujian	Operational; Expansion: 2011	CNOOC	340 / 170	Indonesia - Tangguh
Shanghai	Construction: 2009; Expansion: 2012	CNOOC; Shenergy	390 / 390	Malaysia - Petronas
Dalian	Construction: 2011; Expansion: TBD	PetroChina	390 / 390	QatarGas II
Rudong/Jiangsu	Construction: 2011; Expansion: TBD	PetroChina/ Pacific Oil & Gas	460 / 460	QatarGas IV
Zhejiang/Ningbo	Approved: 2012; Expansion: TBD	CNOOC	390	TBD
Qingdao	Approved: 2012	Sinopec, Huaneng Group	390	TBD
Zhuhai	Construction: 2010	CNOOC, Yudian Group	260	TBD
Shenzhen	Construction: TBD	CNPC, CLP	390	TBD

Coal

China is the largest producer and consumer of coal in the world, and many of China's large coal reserves have yet to be developed.

Coal makes up 70 percent of China's total primary energy consumption, and China is both the largest consumer and producer of coal in the world. China holds an estimated 114.5 billion short tons of recoverable coal reserves, the third-largest in the world behind the United States and Russia and about 13 percent of the world's total reserves. There are 27 provinces in China that produce coal. Northern China, especially Shanxi Province, contains most of China's easily accessible coal and virtually all of the large state-owned mines. Coal from southern mines tends to be higher in sulfur and ash, and therefore unsuitable for many applications. In 2008, China consumed an estimated 3 billion short tons of coal, representing nearly 40 percent of the world total and a 129 percent increase since 2000. Coal consumption has been on the rise in China over the last eight years, reversing the decline seen from 1996 to 2000. More than 50 percent of China's coal use in 2006 was in the non-electricity sectors, primarily in the industrial sector. The other 50 percent is used in the power sector.



China's coal industry has traditionally been fragmented among large state-owned coal mines, local state-owned coal mines, and thousands of town and village coal mines. The top three state-owned coal companies produce less than 15 percent of the domestic coal. Shenhua Coal, the world's largest coal company, holds 9 percent of the domestic market in China.

Though the smaller coal mines hold a sizeable portion of the market, they are inefficient and are challenged to respond to market demand. China has tens of thousands of small local coal mines where inefficient management, insufficient investment, outdated equipment, and poor safety records prevent the full utilization of coal resources. The goal of consolidating the industry is to raise total coal output, attract greater investment and new coal technologies, and improve the safety and environmental record of coal mines. According to one industry report, at the end of 2005 China had 25,000 coal mines. Independent analysts estimate that over the past several years China has closed down between 20,000 and 50,000 small coal mines and about 200 million tons of production from small mines is slated for closure.

In contrast to the past, China is becoming increasingly open to foreign investment in the coal sector, particularly in an effort to modernize existing large-scale mines and introduce new technologies into China's coal industry. The China National Coal Import and Export Corporation is the primary Chinese partner for foreign investors in the coal sector. Areas of interest in foreign investment concentrate on new technologies with efficiency and environmental benefits, including coal liquefaction, coal bed methane (CBM) production, and slurry pipeline transportation projects. The Chinese government is actively promoting the development of a large coal-to-liquids industry. In a recent government survey, the Ministry of Land and Natural Resources reported that China has about 1,300 Tcf of geological CBM reserves, the world's third largest. A Shenhua Group subsidiary completed construction of the country's first coal-to-liquids plant in 2008. The facility will be located in the Inner Mongolia Autonomous Region and have an initial capacity of approximately 24,000 bbl/d of diesel, ramping up to 240,000 bbl/d by 2015. There are seven other CTL plants under development by the Shenhua Group who intends to produce 30 million tons/y of oil products and chemicals by converting over 100 million tons of coal. CNPC signed an agreement with Shanxi Energy Industries Group to develop CBM resources in the Qinshui Basin in 2007, and the NOC has been performing technological research on CBM plays in northern China for over a decade. Also, in another attempt to move into downstream markets and garner technological experience, CNOOC plans to invest $4.4 billion to build a coal to gas plant in Shanxi Province. The plant is slated to produce 141 Bcf/y of gas and market several northeastern cities. FACTS Global Energy estimates that total CBM production in 2008 was 482 Mmcf/d, more than double the volume in 2005.

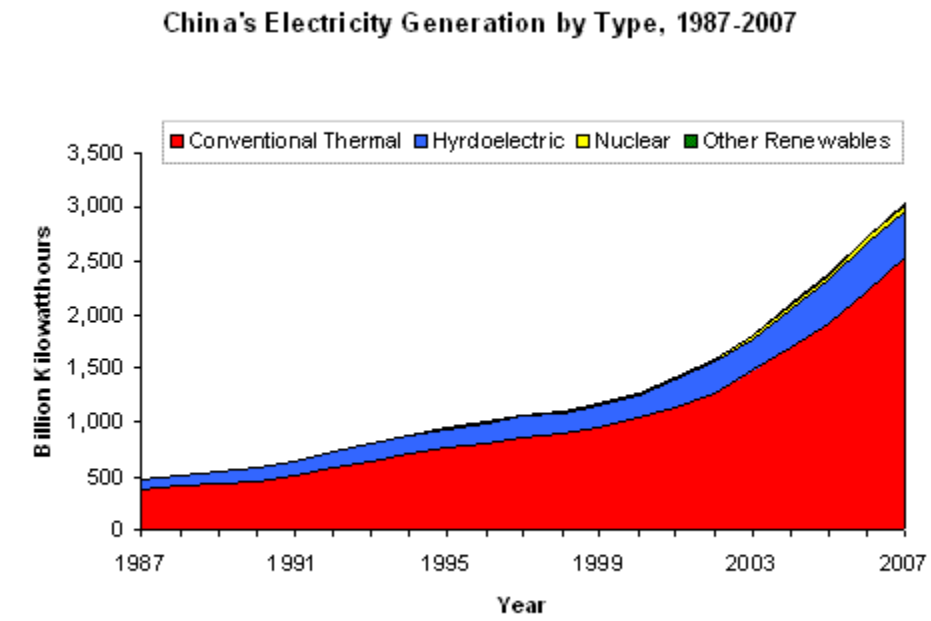
China's coal imports started growing after 2002 because imported coal prices including transportation became competitive with domestic production prices and the coal industry suffers from frequent bottlenecks in transmission to consumer markets. In the next five to ten years, China could become a net coal importer according to some projections.

Electricity

China's electricity generation continues to be dominated by fossil fuel sources, particularly coal. The Chinese government has made the expansion of natural gas-fired power plants a priority.

In 2007, China had total installed electricity generating capacity of 624 gigawatts (GW), and 3,042 billion kilowatt-hours (Bkwh) of generation, 83 percent of which came from conventional thermal sources. In 2006, China generated 2,718 Bkwh and consumed 2,529 Bkwh of electricity. Since 2000, both electricity generation and consumption have increased by over 110 percent. Installed capacity is expected to grow in the next decade to meet rising demand, and China could add another 80 GW of new installed capacity in 2009.

Rapid growth in electricity demand this decade has spurred significant amounts of investment in new power stations. Although much of the new investment was earmarked to alleviate electricity supply shortages, the economic crisis of late 2008 resulted in declining power demand growth. Some industry analysts forecast the possibility of oversupply as an assortment of new projects are scheduled to come online in the next few years. The government anticipates that power demand will rebound once the Chinese economy recovers, and is focused on using some of the stimulus package to invest in further development of the transmission network, integration of regional networks, and bringing on planned new generating capacity.



Source: EIA International Energy Annual

Sector Organization

In 2002, the Chinese government dismantled the monopoly State Power Corporation (SPC) into separate generation, transmission, and services units. Since the reform, China's electricity generation sector is dominated by five state-owned holding companies, namely China Huaneng Group, China Datang Group, China Huandian, Guodian Power, and China Power Investment. These five holding companies generate about half of China's electricity. Much of the remainder is generated by independent power producers (IPPs), often in partnership with the privately-listed arms of the state-owned companies. Deregulation and other reforms have opened the electricity sector to foreign investment, although this has so far been limited.

While the generation sector has some market competition, the transmission and distribution sectors are heavily state-controlled. During the 2002 reforms, SPC divested all of its electricity transmission and distribution assets into two new companies, the Southern Power Company and the State Power Grid Company. The government aims to merge SPC's 12 regional grids into three large power grid networks, namely a northern and northwestern grid operated by State Power Grid Company and a southern grid operated by the Southern Power Company by 2020. Also in 2002, the State Electricity Regulatory Commission (SERC) was established, which is responsible for the overall regulation of the electricity sector.

Wholesale and retail electricity prices are determined and capped by the NDRC which can limit

the profit margin of generators. Generators accrued considerable financial losses during the peak of thermal fuel prices in mid-2008 and market-based fuel prices could not be passed on to the grid and other electricity end-users. This was another factor leading to power supply shortages as some generators were forced to shut down. Coal prices have collapsed in 2009; however, still remain above current market rates as price negotiations continue between these parties. This phenomenon could have contributed to a surge in coal imports to China in the first half of 2009 as power generators are seeking less expensive fuel sources. Also, electricity rates currently favor industrial customers and can be over 40 percent lower than other retail customers. The NDRC is currently drafting a reform of electricity prices due to be released at the soonest in 2009.

Conventional Thermal

Conventional thermal sources are expected to remain the dominant fuel for electricity generation in the coming years, with many power projects under construction or planned that will use coal or natural gas. As with coal mining, the Chinese government is looking to shut down or modernize many small and inefficient power plants in favor of medium-sized (300 to 600 MW) and large (1000 MW and up) units. China's eleventh five-year plan, covering the period 2006-2010, calls for the country to increase the share of natural gas and other cleaner technologies into the country's energy mix and close several smaller coal-fired plants that were less efficient and heavy polluters. Recently, the NEA announced the government plans to remove 31 GW of coal generation in the next three years. Coal consists of roughly three-quarters of the power generation feedstock and the EIA forecasts they will maintain this market share through 2030.

Natural gas will see the greatest percentage rise in installed electricity generation capacity over the next decade, but coal is expected to show the largest increase in absolute terms. There are several examples of China's effort to bring new natural gas-fired power stations online some in conjunction with LNG terminals coming online, though the fuel will continue to play a marginal role in the power sector's fuel mix based on the higher cost of LNG and imported pipeline supplies versus coal. In July 2006, Huaneng Power International, which is China's largest listed electricity generation company, started operations at a new natural gas-fired power plant in Shanghai. The facility has a capacity of 1,200 MW. The 1,170MW-Qianwan LNG power plant located in Guangdong Province, started up in January 2007. China is also constructing several other combined cycle units in Guangdong including the 1,170-MW Huizhou power plant and the Shenzhen Energy Group plant that will use LNG from the new Dapeng terminal. There are approximately 20 gas-fired power plants in operation or under construction and generating about 20 MW. Also, there are several coal-fired and oil-fired power plants that are being converted to run on natural gas in Guangdong.

Hydroelectric and Renewables

China commissioned the Three Gorges Dam hydroelectric facility, the largest hydroelectric project in the world, in 2009.

In 2007, China was the world's largest producer of hydroelectric power. In the same year, China generated 430 Bkwh of electricity from hydroelectric sources, representing 14.1 percent of its total generation. Also, installed generating capacity was around 170 GW in 2008, accounting for about a fifth of total installed capacity. These figures are likely to increase given the number of large-scale hydroelectric projects planned or under construction in China. The largest power project under construction is the Three Gorges Dam along the Yangtze River, which will include 32 separate 700-MW generators, for a total of 22.5 GW. When fully completed, it will be the largest hydroelectric dam in the world. The Three Gorges project already has several units in operation as of 2009, but the project is not expected to be fully completed until 2011.

Wind is the second leading renewable source for power generation, and China is the world's fifth largest wind producer, generating 5.6 Bkwh in 2007 and 95 percent growth from 2006. China's installed capacity in 2007 was 6.06 GW, more than double the amount in 2006. The NDRC aims to increase wind capacity to 10 GW by 2010.

Nuclear

China is also actively promoting nuclear power as a clean and efficient source of electricity generation. Although nuclear capacity (nearly 9 GW) makes up only a small fraction of China's installed generating capacity, many of the major developments taking place in the Chinese electricity sector recently involve nuclear power. China's government forecasts that about 60 to 70 GW will be added by 2020. EIA forecasts that China will increase its nuclear generation to about 424 Bkwh by 2030, growing 8.9 percent per year between 2006 and 2030.

As of mid-2009, China has 8 new nuclear power plants under construction and another 8 in the planning stage, the biggest of which is a 4.4-GW nuclear complex at Haiyang in Shandong

province, set to begin commercial operation in 2014.

China also intends to build strategic and commercial uranium stockpiles through overseas purchases as well as further developing domestic production in Inner Mongolia and Xinjiang.

Profile

Energy Overview

Proven Oil Reserves (January 1, 2009E)	16 billion barrels
Oil Production (2008E)	3,973 thousand barrels per day
Oil Consumption (2008E)	7,849 thousand barrels per day
Crude Oil Distillation Capacity (20068)	6,400 thousand barrels per day
Proven Natural Gas Reserves (January 1, 2009E)	80 trillion cubic feet
Natural Gas Production (2007E)	2,446 billion cubic feet
Natural Gas Consumption (2007E)	2,490 billion cubic feet
Recoverable Coal Reserves (2005E)	114.5 billion short tons
Coal Production (2004E)	2,795 million short tons
Coal Consumption (2004E)	2,773 million short tons
Electricity Installed Capacity (2007E)	623.6 gigawatts
Electricity Production (2006E)	2,718 billion kilowatt hours
Electricity Consumption (2006E)	2,529 billion kilowatt hours
Total Energy Consumption (2006E)	73.8 quadrillion Btus*, of which Coal (70%), Oil (20%), Hydroelectricity (6%), Natural Gas (3%), Nuclear (1%), Other Renewables (0.1%)
Total Per Capita Energy Consumption (2006E)	56.2 million Btus
Energy Intensity (2006E)	13,780 Btu per $2000-PPP**

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2006E)	6,018 million metric tons
Per-Capita, Energy-Related Carbon Dioxide Emissions (2006E)	4.6 metric tons
Carbon Dioxide Intensity (2006E)	1.1 Metric tons per thousand $2000-PPP**

Oil and Gas Industry

Organization	China's oil and gas industry is dominated by three state-owned holding companies: the China National Petroleum Corporation (CNPC); the China Petroleum and Chemical Corporation (Sinopec); and the China National Offshore Oil Corporation (CNOOC).
Major Oil/Gas Ports	Shanghai, Zhanjiang, Zhuhai, Guangzhou, Xiamen (Amoy), Hangzhou, Qingdao, Dalian, Tianjin
Major Refineries (capacity, bbl/d)	Zhenhai (403,000), Ningbo (320,000), Nanjing (270,000 and 160,000), Maoming (270,000), Lazhou (250,000)

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power.
**GDP figures from Global Insight estimates based on purchasing power parity (PPP) exchange rates.

Links

EIA Links
EIA – China Country Energy Profiles

U.S. Government
CIA World Factbook - China
Lawrence Berkeley National Laboratory (LBNL) - China Energy Group
National Renewable Energy Laboratory (NREL) - China
U.S. State Department Consular Information Sheet - China Programs
U.S. State Department Background Notes on China
U.S. Embassy, Beijing
U.S. Census Bureau – U.S. Trade Balance With China
U.S. Trade Representative (USTR) – China Affairs
USTR Report – U.S.-China Trade Relations: Top-to-Bottom Review (February 2006)

Associations and Institutions
Asian Development Bank (ADB) – China page
The World Bank
The International Monetary Fund – China page
The United Nations (UN) in China
The World Trade Organization (WTO) – China page
The World Health Organization (WHO) – China page
Association of Southeast Asian Nations (ASEAN) Plus Three
Asia-Pacific Economic Forum (APEC) – China page

Foreign Government Agencies
National Bureau of Statistics of China
National Development and Reform Commission (NDRC)
China's Ministry of Commerce
China's
China's Ministry of Land and Resources

Non-Governmental Organizations
The China Sustainable Energy Program (CSEP)
Peterson Institute for International Economics (IIE)
National Bureau of Asian Research (NBR) – Asian Energy Security Program

Oil and Natural Gas
China National Petroleum Corporation (CNPC)
China Petrochemical Corporation (Sinopec)
China National Offshore Oil Corporation (CNOOC)
ExxonMobil – China
Shell – China

Sources

Asia Pulse
BBC
Business Week
China Daily
China Oil and Gas Monthly
Coal Week International
Congressional Research Service
Dow Jones Newswire
Economist
Economist Intelligence Unit
FACTS Global Energy
Financial Times
Foreign Affairs
Global Insight
International Gas Report
National Bureau of Statistics of China

Oil and Gas Journal
Petroleum Economist
Petroleum Argus Weekly
Petroleum Intelligence Weekly
Petroleum Review
PFC Energy
Platts Commodity News
Reuters
Rigzone
U.S. Commerce Department
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Wall Street Journal
World Gas Intelligence
Xinhua News Agency

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